

With the Compliments of

ALEXANDER AGASSIZ.

ANNUAL REPORT

OF

THE CURATOR

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

AT HARVARD COLLEGE,

TO THE

PRESIDENT AND FELLOWS OF HARVARD COLLEGE,

FOR

1886-87.

CAMBRIDGE:

UNIVERSITY PRESS: JOHN WILSON AND SON.

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FACULTY OF THE MUSEUM.

CHARLES W. ELIOT, *President.*

ALEXANDER AGASSIZ, *Curator.*

GEORGE L. GOODALE.

JOSIAH D. WHITNEY, *Secretary.*

HENRY P. BOWDITCH.

OFFICERS.

ALEXANDER AGASSIZ *Curator.*

JOSIAH D. WHITNEY *Sturgis-Hooper Professor of Geology.*

HERMANN A. HAGEN *Professor of Entomology.*

NATHANIEL S. SHALER. . . . *Professor of Palæontology.*

E. L. MARK *Hersey Professor of Anatomy.*

W. M. DAVIS *Assistant Professor of Geography.*

J. ELIOT WOLFF *Instructor in Petrography.*

HOWARD AYERS *Instructor in Zoölogy.*

WALTER FAXON *Assistant in Zoölogy.*

D. D. SLADE *Assistant in Osteology.*

SAMUEL GARMAN *Assistant in Herpetology and Ichthyology.*

J. WALTER FEWKES { Assistant in charge of Invertebrates, and of the
Newport Marine Laboratory.

WILLIAM BREWSTER *Assistant in Ornithology and Mammalogy.*

ALPHEUS HYATT *Assistant in Palæontology.*

MISS F. M. SLACK *Librarian.*

REPORT.

TO THE PRESIDENT AND FELLOWS OF HARVARD COLLEGE:—

DURING the past year the following courses of instruction have been given at the Museum:—

A course in Biology, by Professor Farlow and Dr. Ayers.

A course in Zoölogy, by Dr. Ayers, who had charge of the general Biological Laboratory assisted by Mr. G. H. Parker.

Two courses in Cryptogamic Botany, by Professor Farlow.

General Lectures on Zoölogy, by Professor Mark. A course in Microscopic Anatomy and a course of Embryology were also given by Professor Mark. In the Laboratory work he was assisted by Mr. G. H. Parker.

Professors J. D. Whitney, Shaler, and Davis gave the usual courses in Geology, Palæontology, Physical Geography, and Meteorology.

Since my last report a Petrographical Laboratory has been fitted up at the Museum, together with a small room for the necessary chemical work, and another in the basement of the building for making rock sections. The Petrographical Department has been placed in charge of Mr. J. E. Wolff, who has given Lectures and supervised the Laboratory work.

For the details of the courses of instruction, I would refer to the accompanying special Reports of the Professors and Instructors.

In addition to the regular instruction of the University, I may mention a course by Dr. Slade on Comparative Osteology.

The Assistants of the Museum, Professors Hagen and Faxon, Dr. Slade, Mr. Garman, Mr. Brewster, Professor Hyatt, and

Dr. Fewkes, have all spent considerable time in supplying material and information to special students in their various departments. A number of students interested in Marine Invertebrates accompanied Dr. Fewkes on several dredging excursions. The lectures he had been accustomed to give, however, were not continued during the past year. It would be an advantage to the students of Natural History if the special and exact knowledge of the Museum Assistants could be made available in the way of lectures or informal instruction as a part of their course of study.

In my last Report I called attention to the want of Laboratory room in the Museum building, and to the great need of an additional section of the building to meet the requirements of the large classes in all departments of Natural History. The Geological and Palæontological Laboratories ought to be supplemented by properly equipped rooms for Lithology and Geography, as well as by small exhibition rooms devoted to those subjects, to form a part of the general exhibition scheme of the University Museum. Another large Lecture-room is absolutely necessary, and an additional section of the Museum building would merely place the Geological and Geographical Departments on the same footing as Zoölogy and Palæontology.

Thanks to the efforts of Professor Goodale, a sum sufficiently large for the erection of a section of the University Museum has been secured. It will be devoted to the Botanical Laboratories and the Botanical Museum, which will be connected with the other Exhibition Rooms of the University Museum and of the Museum of Comparative Zoölogy. The Cryptogamic Laboratory, which has for some years been sheltered in the Zoölogical Laboratory and work-rooms, would give us additional space in that department. It is, however, very important that the section needed for Geology and Geography should adjoin the present University Laboratories, and that the Botanical Department should follow next, in order to retain in the Exhibition Rooms the sequence most natural for a public exhibit.

The new staircase erected to facilitate the access of the public to the Exhibition Rooms has been completed, and serves the purpose for which it was planned.

Important additions have been made in the equipment of all our Laboratories, materially increasing their efficiency.

Dr. Fewkes has, as usual, taken charge of the Newport Marine Laboratory. He has continued his work on the development of Echinoderms. Four students passed a part of the summer at Newport, collecting and preparing material for future work on the Eyes of Lobsters and on Ascidians.

I may mention the following persons to whom material for study has been sent: Mr. J. A. Allen, Professor Cope, Lieut. Thomas Casey, Dr. Joubin, Professors Leidy, Lovén, Sollas, and Wilder, and Mr. Robert Ridgway. A number of exchanges have been made, which are mentioned in the special Reports of the Museum Assistants.

A number of specialists have made use of our collections, and carried on their work for a time in the Museum building. The Fish, Reptile, Bird, Insect, Invertebrate, Osteological, and Palæontological collections have all been freely examined and consulted during the past year. I may specially mention the study of our White River beds Vertebrate Collection by Professors Scott and Osborne, of which a preliminary notice has been published in the Museum Bulletin; and the systematic study of a large part of our South American Fishes by President Jordan, which will be incorporated in his final Report on the Fishes of South America.

The principal accessions to our collections are the following:—

The specimens we continue to receive from Professor H. A. Ward, to fill the gaps in the Birds and Mammals of our Exhibition Rooms; a series of types of Chinese Fishes and Reptiles from the Lyons Museum, and purchases of West Indian and African species, and a number of small collections of Insects.

A collection of Invertebrates made by the "Albatross," from the U. S. Fish Commission.

A collection of Fossils from the Secondary rocks of England, selected for the Museum, through the courtesy of Dr. Woodward of the British Museum, by Mr. Etheridge.

Several collections of Fossils from Professor Shaler, a valuable collection of typical Fossils presented by James Hall from the Board of Regents of the State University of New York, and a small collection of Fossil Mammals from the Phosphorites of Southern France.

A collection from the Middle Cambrian of the United States, from Mr. C. D. Walcott of the Geological Survey.

The greater part of our collection of North American Spiders, which had been sent to Count Keyserling for study, has been returned. He has during the past ten years published several papers largely based upon the material received from the Museum.

Professor Lesquereux has returned the fossil plants sent him to assist in the preparation of his Report on Cretaceous Plants for the United States Geological Survey.

We have also received two additional invoices of wax models from Drs. Ziegler and Weisker, for the use of the Instructors in Zoölogy.

The Museum is again indebted to Messrs. Brewster, Cabot, Lyman, and Slade, for their interest in behalf of their respective departments. We also owe to Mr. Augustus Hemenway the collections made by Dr. Fewkes while he accompanied him on the Pacific coast.

As will be seen from the Reports of the Assistants, the condition of the collections continues excellent. In proportion as the gaps in our Exhibition Rooms are filled, the care of the collections in the various departments becomes less and less a burden. By carefully considering our purchases and other acquisitions, the Assistants will, I hope, be able to devote more and more of their time to original work.

A large amount of material ready for exhibition has been placed in both the Atlantic and Pacific Rooms, and many gaps have been filled in our other Exhibition Rooms.

For the Tertiary Exhibition Room a fine restoration of *Dinoceras* has been purchased, through the kindness of Professor Marsh, and has been prepared and mounted by Mr. J. H. Emerton.

Professor Hyatt has so far advanced with the preliminary arrangement of our Invertebrate Fossils, that, for the first time in the history of the Museum, it has become possible to form some opinion of the value of our collection. The Museum is indebted to Messrs. Jackson and Brooks for the assistance they have rendered to Professor Hyatt while engaged in the Palæontological collections.

Professor Faxon has kindly continued in charge of our collection of Crustacea, and he has spent considerable time on his Revision of the Cray-Fishes.

A list of the Museum publications issued during the past Academic year is given in Appendix A of this Report. They consist of five numbers of the Bulletin, and two numbers of the Memoirs. This is rather a smaller amount of published matter than usual; but several of the Bulletins have been delayed from the difficulty of obtaining the necessary illustrations. Also one volume of the Memoirs, to contain Ehlers's Florida Annelids, will be issued shortly as a whole, as well as the two volumes of the Bulletin containing my General Report on the "Blake" expeditions. An addition to the list shows the publications in preparation, and with each special Report will be found a list of the publications of the Assistants of the Museum, of the publications based upon the materials of the institution, or of investigations carried on by the Professors and students of the University in our Laboratories.

Over 400 volumes, and more than 1,500 parts of volumes and pamphlets, have been added to the Library during the past year.

The Museum has lost the services of Mr. Lyman, who has been connected with it from the beginning, either as one of the original Trustees, or as member of its Faculty, since the Museum became a part of the University. During the whole of that time Mr. Lyman has not only been engaged upon his investigations of the Ophiurans, but has shown his deep interest in many ways in the welfare of the Museum and in its progress. Unfortunately, the state of Mr. Lyman's health became such that he felt compelled to tender his resignation as member of the Faculty and as Assistant in the Museum. The Faculty most reluctantly accepted his resignation, and nominated Professor H. P. Bowditch to fill this vacancy, and this nomination has been confirmed by the President and Fellows.

ALEXANDER AGASSIZ.

CAMBRIDGE, October 1, 1887.

REPORT ON THE GEOLOGICAL DEPARTMENT.

BY JOSIAH D. WHITNEY, *Sturgis-Hooper Professor of Geology.*

IN this department a course of Lectures (two a week, lasting through the College year) was delivered to about a dozen members of the Senior Class in College, and a few others, — graduates and teachers, or Assistant Professors. The subject of this course was the physical geography and geology, and the mineral and agricultural resources of the United States, with especial reference to the possible and probable future development of these resources. This course was, to a considerable extent, a working over, with the aid of extensive cartographic and photographic illustrations, of material collected for the article "United States," to be published in the twenty-third volume of the *Encyclopædia Britannica*, mention of which article was made in the last year's Report. This article, which, as written, would occupy the space of an ordinary octavo volume of about 300 pages, has been somewhat abbreviated and condensed by the editors of the *Encyclopædia*; in view of this fact, and since it is believed that this work will form a convenient text- or reference-book for College and other students, it will probably soon be republished, with considerable additions and emendations, in separate book form.

The preparation of definitions of words in physical geography, geology, lithology, mining, and metallurgy, for the *Century Dictionary*, has absorbed much time during the past year. This work has been done, partly because it seemed very desirable that words in these branches of science should somewhere be correctly and fully defined (which is something that has not yet been accomplished), and also because it falls in, and is in harmony, with a work long since contemplated, and now in actual preparation by the Sturgis-Hooper Professor; namely, a somewhat elaborate and complete discussion of the nature and origin of mineral deposits, for which work he has, for several years, been

collecting the materials. Incidentally arising out of this definition work, and closely connected with it, has been the preparation of a small volume, now about half through the press, in which are given the results of some investigations into the names of the topographical features of this and other countries, with which are interwoven various historical matters connected with geographical discovery, especially in the Northwestern United States.

Field-work has also been carried on, to a limited extent, in connection with this investigation of the surface deposits and glacial phenomena of Northeastern North America, mention of which investigations was made in the last Report. It is hoped that a preliminary statement of progress made in this investigation may be got ready for publication in the coming spring, and that it may form a part of the second volume of the Geological Series of the Museum Bulletin.

Professor Wadsworth's work on the lithological collections has been continued during his vacations, and it was expected that the second and concluding portion of his volume of "Lithological Studies" would before this time have been ready for the press. His recent appointment as Director of the Michigan Mining School will render a further delay necessary. This delay is much to be regretted, but it is one for which the Sturgis-Hooper Professor is not responsible.

REPORT

ON THE INSTRUCTION IN GEOLOGY, PALÆONTOLOGY,
PHYSICAL GEOGRAPHY, AND PETROGRAPHY.

BY PROFESSORS N. S. SHALER AND W. M. DAVIS, AND MR. J. E. WOLFF.

DURING the Academic year 1886-87, the following courses of instruction were given in the Geological and Palæontological Laboratory, and in the field, by N. S. Shaler and his Assistants.

1. N. H. 4. A course in Elementary Geology, by N. S. Shaler; two lectures a week with certain required reading, attended by one hundred and sixty-two students.

2. Laboratory Course. A course of practical geological exercises in laboratory and in the field, by Mr. Harris, designed especially for those who intended, in subsequent years, to continue the study of Geology and Palæontology; attended by sixty-one students.

3. N. H. 8. A course in Advanced Geology, by N. S. Shaler, Wm. M. Davis, and J. E. Wolff; two lectures a week, together with the assigned field-work, which was supervised by Prof. Davis and Mr. Wolff. In the winter season the field-work was replaced by the study of models and geological maps, and reports on different areas. Students in this course were required to prepare each two theses on assigned subjects. Only those who had previously passed a satisfactory examination in Elementary Geology were permitted to attend. Forty-six persons received this instruction.

4. N. H. 14. A course in Palæontology, by N. S. Shaler; two lectures a week, together with laboratory work and assigned theses, attended by twenty-eight students.

5. N. H. 16. A course in field-work, designed to afford special training in the processes of geological surveying, by N. S. Shaler, Wm. M. Davis, and John E. Wolff; attended by ten students.

6. N. H. 17. A course in Historic Geology, designed to train the student in the determination of geological horizons. This course was attended by two students.

During the winter season the students in the advanced classes attended regular evening meetings, designed to serve the purpose of the Seminaria of the German Universities.

During the summer of 1887, twenty-two students, eight of whom had been previously trained in the classes of the University, received systematic training in field-work. Sixteen of these persons were included in the Summer School of Geology, which was taught in Cambridge, at two points in Southern Connecticut, in the Catskills, and at North Adams, by the officers of this department.

During the year the following papers of a scientific nature have been published by N. S. Shaler:—

1. The Fluvial Swamps of New England. *American Journal of Science*, March, 1887.
2. Preliminary Report on the Sea-coast Swamps of the Eastern United States, in the Sixth Annual Report of the Director of the U. S. Geological Survey.
3. Notes on *Taxodium distichum*, or Bald Cypress. *Memoirs of the Museum of Comparative Zoölogy*, Vol. XVI., No. 1.
4. On the Original Connection of the Eastern and Western Coal Fields of the Ohio Valley. *Memoirs of the Museum of Comparative Zoölogy*, Vol. XVI., No. 2.
5. Four papers on the study of Field Geology, in the *Boston Journal of Science*.
6. On the Stability of the Earth. *Scribner's Magazine*, Vol. I., No. 3.
7. On the Forests of North America. *Scribner's Magazine*, Vol. I., No. 5.
8. On the Instability of the Atmosphere. *Scribner's Magazine*, Vol. II., No. 2.
9. On the Origin and Nature of Rock Gas. *The Forum*, April, 1887.

During the past year, the in-door work of Professor W. M. Davis has been carried on in the Lawrence Scientific School building, on account of lack of room in the Museum; but it is hoped that this arrangement may be only temporary. His Elementary Course in Meteorology and Physical Geography (N. H. 1) was attended by twenty-eight students; the Advanced Course (N. H. 20), by two students. It is proposed in the coming year to give even more attention than heretofore, in the course in Physical Geography (Physiography), to the description of the form and development of geographic types, thus introducing into geography the principle so successfully employed at present in biological teaching.

The share of Mr. Davis in geological instruction has been

almost entirely in field-work. Besides this regular work in term time, an excursion was made in the April recess, with a party of eight students, to New Britain, Conn., where attention was given to the structure of the Triassic monoclinial; and the Summer School of Geology, while under Mr. Davis's direction, spent ten days at the same place in July, and then moved to Catskill, N. Y., for a week in August. Both of these stations proved to be excellently adapted to the needs of practical field instruction.

In December, 1886, Mr. Davis gave five lectures in Boston, on "Problems in Physical Geography," in the Lowell Free Course under the direction of the Boston Society of Natural History.

The following papers have been published by Mr. Davis:—

1. Relation of the Coal of Montana to the Older Rocks: a Report on Field-work in 1883 for the Northern Transcontinental Survey, published (1887) in Report of Census of 1880, Vol. XV. pp. 697-712.
2. The Mechanical Origin of the Triassic Monoclinial in the Connecticut Valley. Abstract in Proceedings of the American Association, 1886. In full in American Journal of Science, November, 1886.
3. Methods of Instruction in Geological Investigation: an Address read in December, 1886, before the Association of American Naturalists. Revised and published in American Naturalist, September, 1887.
4. Three brief articles on Cyclones, printed on the Pilot Charts of the North Atlantic, issued by the U. S. Hydrographic Office for August, September, and October, 1886.
5. Mountain Meteorology. Appalachia, 1886.
6. The Foehn in the Andes. American Meteorological Journal, May, 1887.
7. Monthly Bulletin of the New England Meteorological Society, from October, 1886, to September, 1887. Edited with assistance of Sergt. O. N. Oswell, Signal Corps U. S. Army.

Three rooms have been assigned to the Petrographical Laboratory, in charge of Mr. Wolff. A large room was used for the lectures and microscopic work and collections, another room for the chemical work, and a room in the basement for making thin sections of rocks with a grinding machine. The laboratory was provided with a large Nachet microscope and other smaller microscopes, an electro-magnet, and other petrographical apparatus. In addition to the other collections, the large Brooks collection of American and foreign rocks was received for

study. There are at present about one thousand rock sections with the collections.

The instruction of Mr. Wolff consisted of lectures twice a week, and laboratory work. The course was attended by seven students throughout the year, and to others instruction was temporarily given.

Mr. Wolff's own work has been a study of the altered sediments represented by the gneissic rocks of the Green Mountains, in connection with three summers of field-work in that region. The results are interesting in their bearing on metamorphism.

REPORT ON THE INSTRUCTION IN BIOLOGY.

BY PROFESSORS FARLOW AND MARK, AND DR. AYERS.

THE courses in Zoölogy in charge of Professor Mark during the past academic year have remained substantially as during the previous year, with the exception of Nat. Hist. 2, which, as a part of a general plan to provide half-year elementary courses in several branches of science, was reduced from a full course to a half course. It was also thought desirable to introduce laboratory exercises as a part of the work. It being obviously impracticable, as well as undesirable, to train a large number of students, the most of whom never expect to pursue zoölogy further, in the difficult labor of making dissections, the instructor has been able to require in this course only the study of material already prepared. This, however, has proved to be a valuable means of illustrating and enforcing the subjects treated of in the lectures, and the result warrants a continuation of the plan. In these laboratory demonstrations the instructor has had the efficient aid of Mr. G. H. Parker as assistant. The course was given during the first half of the year, and was completed by seventy students, — one Graduate, eleven Seniors, nineteen Juniors, twenty-one Sophomores, twelve Freshmen, five special students, and one Scientific School student. There were two lectures a week. For the Laboratory demonstrations — four hours a week — the class was divided into sections.

In N. H. 13 there were five students, — three Graduates, one Junior, and one Scientific School student. The most attention was given this year to Hydra, Star-fishes, and the Earth-worm.

Of the four persons who pursued embryological work (N. H. 9), one has produced a paper, which was completed in June, and will soon appear in the Bulletin of the Museum: "The Eyes in Scorpions, by G. H. Parker." The work of two others was interrupted before the close of the year, but their papers will be

submitted in the course of the autumn. The investigations of the fourth student will be continued during the coming year.

Since the last Report, Professor Mark has published a paper on "Simple Eyes in Arthropods," in the Museum Bulletin, Vol. XIII., No. 3, February, 1887.

About the middle of the year several of the advanced students, the Instructors in Zoölogy, and some of the Museum Assistants, commenced a series of informal bi-weekly meetings for the discussion of zoölogical topics; these meetings were continued till the close of the year, and proved to be interesting and profitable.

During the college year 1886-87 instruction was given by Dr. Ayers in two courses of Zoölogy to forty-four students.

A course in Vertebrate Anatomy was completed by thirteen students; one Graduate, eleven Seniors, and one special student. The lectures and class exercises, fifty-four in number, were devoted to purely anatomical topics, and were occasionally followed by class demonstrations of the more important and accessible objects. The Laboratory work embraced the study by dissection of the following animals as types: the Lamprey, the Skate, the Cod, the Pigeon, and the Cat. As text-books, the class used W. N. Parker's translation of Wiedersheim's "Comparative Anatomy of Vertebrates," T. J. Parker's "Zoöatomy," and Mivart's "The Cat."

A half course in Zoölogy, forming the second half of the course in Elementary Biology, was completed by thirty-one students; six Seniors, sixteen Juniors, five Sophomores, one Freshman, two special students, and one Scientific student. The work was begun in February, and included twenty-six lectures and class exercises, with Laboratory work three days in the week. The following animals were studied in the Laboratory: Paramœcium, Vorticella (or Stentor), prepared specimens of a Campanularian Hydroid and its Medusa, Antedon, the Starfish, the Sea-Urchin, a Holothurian, the Lobster, the Squid, and the Frog.

The class in Biology (Nat. Hist. 5) has been conducted by Professor Farlow on the same plan as in previous years, and the number of students has been as large as the number of microscopes at our disposal would allow. Owing to the unusually large number of graduate students who occupied the room espe-

cially reserved for Cryptogamic Botany, the second course on Cryptogams for undergraduates (Nat. Hist. 23), in charge of Professor Farlow, was conducted in the room on the fifth floor, belonging to the department of Herpetology. The course was taken by eight students, not counting some who attended lectures only, and the work consisted of a study of some of the lower forms of plants, with special reference to the needs of those intending to study medicine. The number of graduate students at work on special cryptogamic topics was seven. A paper by Mr. R. P. Bigelow, "On the Structure of the Frond in *Champia parvula*, Harv.," is already in print in the Proceedings of the American Academy. A paper by Mr. W. M. Woodworth on the apical growth of *Fucus*, and one by Mr. B. L. Robinson on some points in the structure and nomenclature of certain species of Ascomyces, will soon appear in print. Three of the students will remain at Cambridge another year, when it is expected that the work on which they are now engaged will be completed. Mr. J. E. Humphrey, who published last year a paper on *Agarum*, and who contemplated publishing a second paper on the development of some Algæ, has accepted a position at the State University of Indiana for the coming year.

REPORT ON OSTEOLOGY.

 BY DR. D. D. SLADE.

THE department of Osteology has received no additions since the last Report, with the exception of the fossilized femur of a huge undetermined Proboscidian, found beneath the alluvial deposit in the bed of the Missouri River at Rulo, while sinking a shaft, and forwarded to the Museum through the instrumentality of Professor Shaler. Several mammals which have been preserved in alcohol have been sent to Professor Ward, to be prepared as skeletons, but have not yet been returned.

The collection is in excellent condition, and has been much visited, especially by those who wished to avail themselves of the opportunities offered for study and comparison. Among these may be mentioned Professor Thomas Dwight, who made careful measurements of the scapulæ of various skeletons, especially of the Anthropoid Apes, the results of his observations being published in the American Naturalist, for July, 1887, in a paper entitled, "The Range of Variation of the Human Shoulder-blade." Portions of the disarticulated skeletons of *Otaria jubata*, *Phoca ætida*, and *P. grænlantica* were loaned to him for the purpose of making sections, which are skilfully phototyped in his valuable essay, "The Significance of Bone Structure," published in the Memoirs of the Boston Society of Natural History, Vol. IV., No. 1.

Portions of the disarticulated bones of *Cystophora cristata* were also loaned to Mr. J. A. Allen, Curator in the National Museum, Central Park, N. Y., for examination and comparison in the preparation of his paper on the West Indian Seal, *Monachus tropicalis*. For similar purposes, a cast of *Zeuglodon hydrarchus*, from the collection of the Fossil Vertebrates under my charge, was sent to him, and the results published in an article entitled "Note on Squalodont Remains from Charleston, S. C." All of these loans have been returned in good condition.

Comparative Osteology has been recognized for the past two years as a part of the regular course in the University. Instruction during the last academic year has been given by means of lectures and laboratory work. In addition to the regular course, a series of advanced lectures was given on the Anthropoid Apes, and also on the Dentition of Vertebrates. These were attended by four special students, who also did laboratory work. One of them, Mr. W. F. Ganong, prepared a thesis for the degree of A. M., the title of his subject being, "On the Relation of the Form of the Skull to the Habits of Life in the Orders of Mammalia." Two papers upon certain peculiarities presented by the metacarpals of *Bison bonasus* were published by me in Science, Vol. IX., No. 211, and Vol. IX., No. 223.

A paper entitled "Certain Vacuities or Deficiencies in the Skulls of Mammals," is in preparation for publication in the Bulletin of the Museum.

The valuable collection of articulated and disarticulated skeletons of Mammalia in this department of the Museum presents to scientists and students opportunities for observation and comparison that need only to be more widely known to be appreciated, and I am confident that, in the near future, a still larger number will avail themselves of that which is so liberally offered.

REPORT ON THE MAMMALS AND BIRDS.

BY WILLIAM BREWSTER.

DURING the past year comparatively few additions have been made to the mounted collections in this department. A fine Sable Antelope (*Hippotragus niger*), from the Matabele country, and a good adult of the rare West Indian Seal (*Monachus tropicalis*), both furnished by Ward, are the only mammals of especial interest. Of birds, the Museum has purchased a collection of eighty-one specimens, representing seventy-nine species, collected in Australia and New Guinea by the Messrs. Denton; some eighteen species of wading and swimming birds from the North Pacific, six species peculiar to Guadalupe Island (off Lower California); and a superb specimen of the Northern Sea Eagle (*Thalassoaëtus pelagicus*), taken by Dr. Stejneger in Kamtschatka.

Some further progress has been made towards filling the cases in the Atlantic and Pacific Rooms, but pelagic birds and mammals are difficult to obtain, and several years are likely to pass before these collections can be brought to anything like completeness.

Early in the year an examination was made of the alcoholic collection of birds and mammals stored in the basement. Its condition proved unsatisfactory in several respects. The specimens, as a rule, were in a fair state of preservation, but many of them were either unlabelled, or marked with numbers which did not agree with the corresponding ones in any of the Museum catalogues. Moreover, there were many more duplicates, especially of some of the commoner species, than the Museum is ever likely to need. Much of this worthless or superfluous material was discarded, but very much more can be spared to advantage. Unfortunately, this work will require more time than the Assistant can hope to give to it in the near future.

The collection of skins of birds and mammals seems to be now entirely free from insect pests, and, generally speaking, in excellent condition. The tin cases in which it is stored were found to be slightly injured by rust, but prompt measures have been taken to guard against any further danger from this source, by having them painted and janned.

Since the publication of the last Report, the Assistant in this department has published the following papers and notes in "The Auk": —

"Occurrence of the Yellow-billed Tropic Bird in Florida."

"Breeding of the White-faced Glossy Ibis in Florida."

"A Red-headed Black Vulture."

"Two additional Massachusetts Specimens of the Prothonotary Warbler."

"The Golden Eagle in Eastern Massachusetts."

"The Black Gyr Falcon (*Falco rusticolus obsoletus*) in Eastern Maine."

"Three New Forms of North American Birds."

"The Common Murre (*Uria troille*) and the Razor-billed Auk (*Alca torda*) on the New England Coast."

"Further Notes on the Masked Bob-white (*Colinus ridgwayi*)."

"Capture of a third Specimen of the Short-tailed Hawk (*Buteo brachyurus*) in Florida."

"A third New England specimen of Swainson's Hawk (*Buteo swainsoni*)."

"Capture of a Fish Crow (*Corvus ossifragus*), at Wareham, Massachusetts."

"The Redpolls of Massachusetts."

"An overlooked Specimen of Bachman's Warbler."

"Discovery of the Nest and Eggs of the Western Warbler (*Dendroica occidentalis*)."

"Hummingbirds feeding their Young on Insects."

"Scarcity of Adult Birds in Autumn."

REPORT ON THE REPTILES AND FISHES.

BY SAMUEL GARMAN.

The most important acquisitions in these departments were a series of Chinese types, received in exchange from Dr. Lortet of the Lyons Museum; a lot of African species, purchased from Dr. Müller; and a large number of West Indian specimens, bought from Mr. W. B. Richardson. The list of donors includes the names of Dr. C. C. Abbott, Prof. J. A. Allen, Dr. H. Ayers, Prof. S. F. Baird, Miss I. Batchelder, Henry Brooks, Esq., Mr. S. F. Denton, Prof. C. H. Eigenmann, Prof. H. Garman, Mr. Alex. H. Higginson, Col. E. B. Hodge, L. C. Jones, Esq., Jas. E. Mills, Esq., Mr. Geo. B. Shattuck, Dr. R. W. Shufeldt, Mr. T. E. Stone, and N. Vickary, Esq.

As exchanges, a large series was sent to Prof. S. E. Meek, Eureka College, and smaller lots to Dr. H. Woodward, Prof. H. Garman, and the Zoölogical Society of London. A considerable number of Reptiles and Fishes were turned over to Professor Mark and Dr. Ayers for students' use.

The Pleuronectidæ, Sciænidæ, and the Hæmulons were made subjects of special study by Prof. D. S. Jordan.

In connection with overhauling, cataloguing, identification, and preparation for exhibition or for storing, constant attention has been paid to reduction of the bulk of the collections by the withdrawal of useless duplicates. So many of these have been thrown away that the amount of alcohol and glass set free has been more than sufficient to replace what was used during the year in all the departments of the Museum. The changes in the Exhibition Rooms necessitated by discoloration were comparatively few; the loss by evaporation, breakage, or from corrosion of cans was small. Soaking the larger bones in solutions, and use of the bisulphide in the cases, seems to have put an end to the ravages of the insects in the Skeleton Room.

REPORT ON THE ENTOMOLOGICAL DEPARTMENT.

BY DR. H. A. HAGEN.

THE insect boxes of the collection have suffered somewhat from the introduction of steam. Many of the oldest have warped, and it may be necessary to make the bottom of the boxes of two or three thin sheets, as I had done some thirty years ago. These drawbacks have been counterbalanced by a more frequent and energetic supervision. Only few pests (*Anthrenus varius*) have been observed.

The additions to the collection consist of a lot of mixed insects collected by Mr. G. W. Pepper, near Taunton, Mass.; some collected by Mr. Fr. Blake of Weston, Mass., near Chicago; some very interesting biological specimens, mostly Neuroptera from Florida, by Mr. H. G. Hubbard; and other specimens from Mr. G. Jack, of Montreal, Mr. T. Henshaw, of Boston, Mr. Louis Cabot, of Peterborough, N. H., and Prof. W. J. Farlow. Gaps in the Le Conte Collection were filled, as usual, by presents from Dr. G. H. Horn, of Philadelphia, Pa. A lot of Scorpions prepared for anatomical use, from Arizona, was presented by the Boston Herald. Dr. F. Thomas Ohrdruf, of Gotha, Saxony, presented a very valuable lot of plants injured by mite-galls, containing forty types of published species; Mr. B. P. Mann, a lot of Neuroptera collected by him in Brazil; Mr. G. Barnes, a lot of American Noctuidæ and other insects; and Mr. Geo. F. Atkinson, of the University of North Carolina, insects destroying tobacco, cigars, and cigarettes, in all stages.

The alcoholic collection has been carefully revised and brought in order; the determined Myriapoda, Spiders, and Scorpions have been labelled and arranged, and also the types of Chilopoda; the types of the Scorpions, by Mr. E. Simon, Paris, comprising 91 species in 217 bottles; the types of American Spiders, by Count Keyserling, 162 species in 311 bottles; the types of Spiders from

the Peabody Academy, Salem, by Mr. E. Simon and others, 124 species in 129 bottles. All alcoholic insects received from the Peabody Academy have been revised and arranged with the general collection.

About ten years ago a large part of the American Arachnidæ were sent to Count E. Keyserling, in Silesia, who had agreed to study and to publish them. As the collection sent to him has been returned, it may be in place to enumerate his publications. From 1877 to 1887 he has issued seven papers, "Neue Spinnen aus Amerika," in *Verhandlungen Wiener Zool. Bot. Gesellschaft*, containing 151 new species from North America. He has also published a separate work in quarto, "Spinnen Amerikas": Vol. I., *Laterigradæ*, 1880, contains 58, and Vol. II., two Parts, *Theridiidæ*, 1884 and 1886, contains 189 North American species. All these publications are accompanied by plates, many of them colored. A large part of the new species from North America were sent from the Museum, which now contains the types.

The large Monograph of Recent Ephemeridæ, by Rev. A. E. Eaton, published in the Transactions of the Linnean Society, London, (5 Parts,) is now finished, but the last Part has not yet arrived here.

A few species of our collection have been used by Baron von Osten-Sacken in his Monograph of the *Diptera Centrali Americana* for Messrs. Godman and Salvin.

The Myriapoda Chilognatha belonging to the Museum, and now in the way of publication, are the only part of the collection not yet returned from Europe.

Among other publications, the most prominent is the Synopsis of the North American Syrphidæ, by Samuel W. Williston, M. D., in the Bulletin of the National Museum, No. 32, Washington, pp. 335 and pl. 12. He has studied the typical collections of the Museum.

Dr. G. H. Horn, Mr. F. Blanchard of Lowell, Mass., Prof. C. H. Fernald of Amherst, Mass., Prof. Chas. V. Riley of Washington, and others, have made use of our collection for their publications.

Mr. Louis Cabot has resumed his study of the early stages of Odonata. A number of species belonging to the *Cordulina*, *Gomphina*, and *Myrmeleon* have been figured by him.

Mr. F. Woodworth, studying for the Degree of Ph. D., has

worked during the whole term in the Entomological Department on Diptera and Hemiptera, and Mr. G. Jack has continued his biological studies for a part of the time.

The Assistant has rearranged the Lepidoptera of North America, and a part of the exotic Lepidoptera. He has completed the exhibition boxes for the South American, and partly for the Asiatic Fauna. Among the Neuroptera, the large family of Myrmeleon was studied and described, especially the North American species, which are ready for publication.

The beginning of a Monograph of Hemerobidæ, two papers, is printed in the Proceedings of the Boston Society of Natural History, and the Palpares and Acanthaclisis in the Canadian Entomologist, four papers, with the title, "Stray Notes on Myrmeleon." Several papers are published in the Entomologica Americana.

The Assistant visited Washington, Baltimore, Philadelphia, and New York, to study the entomological collections of those cities, and to obtain some material for a paper on Mr. T. Glover, and his large but little known work, which he published in the Stettiner Entomologische Zeitung.

REPORT ON THE INVERTEBRATES.

BY J. WALTER FEWKES.

IN the past year six months have been spent in Cambridge, and the remainder at the sea-shore. A large part of my time in Cambridge has been occupied in the care of the large and varied collections of the Museum now under my charge.

A number of unidentified Corallines has been turned over to Prof. Farlow, who has identified from them a small illustrative collection.

Specimens of some of the types of deep-sea Sponges, identified by Schmidt, have been sent to Dr. Sollas.

Fragments of types of the genus *Stylaster* collected by Pourtales and A. Agassiz have been forwarded to the National Museum at Washington. A large box containing an identified collection of common Corals has been sent to the State Agricultural College, to be used in teaching. Mr. Greene has received from our collection a small box of rare deep-sea Corals.

We have received from the United States Fish Commission a collection of identified Corals and Echinoderms collected by the "Albatross." This collection contains new genera and species described by Prof. A. E. Verrill, with many duplicates.

To Prof. Lovén have been sent specimens of the rare Echinoids *Cælopleurus floridanus* and *Podocidaris sculpta* for study.

A small collection of Echinoderms from the Gulf of California, sent to me by Prof. F. W. Cragin of Topeka, Kansas, has been identified and returned to him.

A specimen of *Pentacrinus* and one of *Pheronema* have been sent to Dr. J. Leidy.

Mr. R. Rathbun of the National Museum has consulted our collection of deep-sea Echinoid types in the preparation of his report on the Echinoids collected by the "Albatross."

Specimens of *Waldheimia* have been presented to the Museum by Prof. O. C. Marsh.

Specimens of *Balanoglossus* and *Tornaria*, collected at the Newport Marine Laboratory at his request, have been sent to Dr. J. W. Spengel.

The Bryozoa collected by A. Agassiz on the Blake Expeditions, and those collected by Count Pourtalès, all of which have been identified and described by Prof. Smitt, have been consolidated.

Specimens of *Fissurella* have been given to Mr. Morrell. A fine specimen of *Voluta juniona* has been sent to Prof. Dall for comparison. The preparations of lingual ribbons of Mollusca made by Mr. Binney have been sent to him for inspection. This collection has been returned. The collection of Mollusca made by the "Blake" in 1880 has been sent to Prof. Verrill for study.

Specimens of our common Squid and one or two duplicate shells of Nautili have been sent to Messrs. Brooks and Jackson for special study. Mr. Ritchie has used our collection of shells for comparisons with those in his collection.

A series of wax models made by Weisker, illustrating the development of certain Invertebrata and Vertebrata, have been put on exhibition in the gallery of the Synoptic Room.

Some time has been spent in showing our Exhibition Rooms to classes visiting the Museum.

The systematic collection of Sponges on exhibition has been rearranged, and many new specimens have been added. The collection of Radiates in the North American Faunal Room has been revised, and mounted specimens of Sponges, Corals, and Echinoderms have been added to those already on exhibition. Representative genera of Holothurians, Ophiurans, and Mollusca have been placed in the collections on exhibition in the South American Room.

As in past years, some time has been taken up in the identification of specimens brought to me for comparison with our types. A part of my time has been spent in supervising Mr. Denton's drawings for Mr. Agassiz.

During February, March, and April I made an excursion to the coast of California, to Santa Barbara, Monterey, and Santa Cruz. My work there consisted of shallow-water dredging and surface-collecting. I made collections and preparations, and paid particular attention to groups of Invertebrata from our Pacific coast, which have been little studied. By means of a small

schooner chartered for the purpose, a trip was made to the island of Santa Cruz, which is rarely visited by naturalists. The dredge and dip-net were profitably used in waters near the island. My expenses on the trip to California were liberally met by Mr. A. Hemenway of Boston. A report on the work done in this expedition is well under way for publication.

The Newport Marine Laboratory was open for work during July, August, and September. Several students availed themselves of its advantages.

The Assistant in charge continued his studies of the development of the Echinoderms.

The following papers have been published for me during the past year:—

Report on the Medusæ collected by the U. S. Fish Commission Steamer Albatross in the Region of the Gulf Stream in 1883–84. Ann. Rep. Com. Fish and Fisheries, 1884.

A new Rhizostomatous Medusa from New England. Am. Journ. Sci., Vol. XXXIII., February, 1887, Art. XIII.

On the Development of the Calcareous Plates of *Amphiura*. Studies from the Newport Marine Laboratory, No. XVIII. Bull. Mus. Comp. Zoöl., Vol. XIII., No. 4.

REPORT ON PALÆONTOLOGY.

 BY ALPHEUS HYATT.

THE result of the year's work can be summarized as follows. The older collections which needed revision and concentration, and the collections still remaining in their original wrappers, were sorted or distributed into zoölogical divisions. A general system of classification of permanent and temporary labels was devised. The permanent label designating the class or division, and a temporary label, which could be snapped into place between the heads of two upholsterer's tacks, devised by Mr. Jackson was adopted. Upon this was written or printed all necessary information as to the contents of the tray, except the name of the class or division, and formation. This label can be removed and re-written as required, and in its final form gives the names of the genera and species contained in each tray. In accordance with this plan of work, the contents of every tray have been inspected, and placed in sufficiently good condition to receive permanent and provisional labels on the outside. The total number of trays is 6,272.

A complete list of the trays and their contents has been made by Mr. R. T. Jackson. The amount of space occupied by each division, including duplicates, is as follows:—

	TRAYS.		TRAYS.
Foraminifera	16	Bryozoa	185
Acalephs	9	Brachiopods	896
Graptolites	59	Lamellibranchs	1032
Sponges	53	Heteropods, Scaphopods, and	
Corals	468	Pteropods	62
Crinoids	294	Gasteropods	622
Cystoids	17	Cephalopods	1067
Blastoids	10	Crustaceans	98
Starfishes	8	Trilobites	466
Ophiurans	1	Eurypterids	15
Echinoderms	179	Simuloids	7
Worms	37	Insects	53

The rapidity with which the work has been accomplished is largely due to Mr. R. T. Jackson's energy, and ability in the handling of collections. Mr. Henry Brooks has also contributed materially to the same end. Both of these gentlemen have received the benefit of opportunities for study in collections and instruction from the Assistant, which have technically repaid them; but they have chosen to return their obligations with a devotion to the interests of the Museum which merits the thanks of the department.

The larger part of the Assistant's time has been given to the arrangement of the Trilobites and Cephalopods. The genera and species of the former have been collated from all the older collections and also from the Barrande and Walcott collections. Mr. Jackson has done similar work upon the Jurassic Lamellibranchs. Mr. C. D. Walcott spent several days in March working over his collection and naming the Brachiopods.

The condition of special collections may be reported as follows.

The Walcott collection has been finished by the Assistant and Mr. Jackson, and received, as noted above, attention from Mr. Walcott himself. It fills 317 trays and contains some large slabs.

The unpacking of the Schary collection has been finished, and the preliminary distribution and labelling completed by Mr. Jackson. The collection fills 877 trays, representing all classes of the fossil Invertebrates of the Bohemian Basin. Work upon the classification of the Trilobites has been begun by the Assistant.

A collection from the Prague Museum has been unpacked and distributed. It fills 15 trays.

A collection from Ireland, presented by the Director in 1875, has been unpacked and distributed. It fills 6 trays.

The Barrande collection, received in 1875, has been unpacked and distributed. There were 26 trays of Trilobites and 9 trays of Brachiopods; all fine specimens, named by that eminent palæontologist.

The Walcott collection of Palæozoic fossils from Nevada has been unpacked, but not distributed. It fills 13 trays.

The extensive collection of Solenhofen and Kelheim fossils purchased from Häberlein had been in part unpacked by Professor Hamlin. This has been finished and distributed. It fills 152 trays and contains 5 slabs.

The Tracy collection of Greensand fossils, from Cambridge, England, has been sorted and distributed, and also the Blake collection from Nevada and the Redmond collection from Sonora, the two last-named being small, but very valuable, collections presented some years since by Professor Whitney.

The Sternberg collection, from Texas, has been sorted and distributed ; it fills 17 trays.

Work has been begun by Mr. Brooks upon the distribution of the Gebhard collection of Devonian and Silurian fossils from Schoharie, N. Y. This had been unpacked and partly worked up by Professor Hamlin.

Almost all the work of sorting and distributing the collections named above, except the Schary, was done by Mr. Brooks.

The Dyer collection has been finished, by the aid of Mr. Jackson, so far as the sorting and distribution of the specimens are concerned, and the labelling of the trays. It fills 376 trays.

The Johnson collection of fossils of Wenlock Limestone has been sorted, but not distributed. It fills $13\frac{1}{2}$ trays.

The Anticosti collection has been brought together by Mr. Jackson, parts of it concentrated, and the trays labelled. It fills 212 trays.

The collection of fossil Insects from the Jura, containing the types of Von Heyden and of Dr. Hagen, were cleaned and re-labelled by Mr. Brooks with great care, and the references to descriptions entered on the labels. The Tertiary fossil Insects were also placed in good condition by Mr. Brooks, but require critical work by some specialist in order to determine the types.

A considerable amount of material has been transferred to the Students' collection ; to the rooms containing Vertebrate fossils, etc. ; to the Geological Department ; and to the Peabody Museum.

One box of fossils was sent to Mr. C. D. Walcott for identification and study.

The following fossils have also been received :—

A collection presented by Prof. N. S. Shaler, contained in 118 trays, and including, among others, some choice Sponges, a valuable set of Corniferous Corals from New York State, some fine Trilobites, two Eurypterids, Walcott's types of Braintree fossils, and a collection from Malvern and Woolhope, England.

The Keeping collection of choice fossils from England, pur-

chased by the Museum and by Professor Shaler, consisting of 27 trays.

A small lot of selected specimens purchased from Ward and Howell.

A collection of authentic species from Professor James Hall and the Board of Regents of New York State University, 224 specimens, representing forms described in the *Palæontology of New York*, Vol. V. Part I.

The Alleghany collection, purchased by the Museum and by Professor Shaler, 46 trays.

Professor Shaler has returned a collection of miscellaneous fossils borrowed by him in former years, and also a number of fossils from the Anticosti collection.

Mr. C. D. Walcott has returned a box of fossils sent him in 1884. Some of the species have been figured in the *Bulletin of the U. S. Geological Survey*, No. 10.

REPORT ON THE LIBRARY.

 BY MISS F. M. SLACK.

DURING the year ending September 1, 1887, the Library has been increased by 433 volumes, 1,477 parts, and 69 pamphlets.

	VOLUMES.	PARTS.	PAMPHLETS.
Gift	21	50	3
Exchange	129	513	31
Purchase	65	158	14
A. Agassiz	70	756	21
Binding Parts	148		
	<hr/> 433	<hr/> 1477	<hr/> 69

The number of volumes now in the Library (exclusive of pamphlets and the Whitney Library) is 17,422. There are 10,375 pamphlets bound in 1,367 volumes, making the total number of volumes 18,789.

[A.]

PUBLICATIONS

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

FOR THE ACADEMIC YEAR 1886-87.

Of the Bulletin.

Vol. XIII., containing —

- No. 1. Reports on the Results of Dredging by the United States Coast Survey Steamer "Blake." — XXX. Report on the HOLOTHURIOIDEA. By H. THÉEL. 22 pp. 1 Plate. October, 1886.
- No. 2. A second Supplement to the Fifth Volume of the TERRESTRIAL AIR-BREATHING MOLLUSCA of the United States and adjacent Territories. By W. G. BINNEY. 26 pp. 3 Plates. December, 1886.
- No. 3. Simple Eyes in ARTHROPODS. By E. L. MARK. 58 pp. 5 Plates. February, 1887.
- No. 4. Studies from the Newport Marine Laboratory. — XVIII. On the Development of the Calcareous Plates of AMPHIURA. By J. W. FEWKES. 41 pp. 3 Plates. May, 1887.
- No. 5. Preliminary Account of the FOSSIL MAMMALS from the White River Formation contained in the Museum of Comparative Zoölogy. By W. B. SCOTT and H. F. OSBORN. 22 pp. 2 Plates. September, 1887.

In preparation : —

- The Lateral System of SELACHIANS. By SAMUEL GARMAN.
- On Certain Vacuities or Deficiencies in the CRANIA OF MAMMALS. By D. D. SLADE.
- On Certain MEDUSÆ from New England. By J. WALTER FEWKES.
- On the Development of the Calcareous Plates of ASTERACANTHION. By J. WALTER FEWKES.
- On New MARINE INVERTEBRATA from California. By J. WALTER FEWKES.
- On the EYES OF SCORPIONS. By G. H. PARKER.

Vols. XIV. and XV.

- Three Cruises of the "Blake." (1877-1880.) A contribution to American Thalassography. By ALEXANDER AGASSIZ.

Of the Memoirs.

Vol. XVI., containing

- No. 1. Notes on the TAXODIUM DISTICHIMUM, or BALD CYPRESS. By N. S. SHALER. 16 pp. June, 1887.

- No. 2. On the Original Connection of the Eastern and Western COAL FIELDS OF THE OHIO VALLEY. By N. S. SHALER. 12 pp. June, 1887. For Nos. 1 and 2, apply to Prof. N. S. Shaler.

In preparation : —

Vol. XIV.

- No. 2. Studies from the Newport Marine Laboratory. — XVI. Development of OSSEOUS FISHES. Part II. By ALEXANDER AGASSIZ and C. O. WHITMAN. With 20 Plates.

Vol. XV.

- No. 1. Reports on the Results of Dredging by the United States Coast Survey Steamer "Blake." — XXXI. Report on the ANNELIDS. By ERNST EHLERS. With 60 Plates.

Vol. XVI.

- No. 3. The Genesis of the ARIETIDÆ. By ALPHEUS HYATT.

Also preparing : —

Illustrations of North American Marine Invertebrates, from Drawings by Burkhart, Sonrel, and A. Agassiz, prepared under the direction of L. Agassiz. Selections from Embryological Monographs, compiled by A. Agassiz, W. Faxon, and E. L. Mark (discontinued for the present). Papers by E. L. Mark, on the Development of *Lepidosteus* and of *Arachnactis*; by A. Hyatt, on Cephalopods; by M. E. Wadsworth; and on Fossil Mammals, by Scott and Osborne.

Reports on the Dredging Operations for 1877, 1878, 1879, and 1880, in charge of Alexander Agassiz, by the U. S. Coast Survey Steamer "Blake." H. B. Brady (*Foraminifera*), P. H. Carpenter (*Comatulæ*), W. H. Dall (*Mollusks of the Gulf of Mexico and the Caribbean Sea*), G. B. Goode and T. H. Bean (*East Coast Fishes and Fishes of the Gulf of Mexico and the Caribbean Sea*), A. E. Verrill and W. H. Dall (*East Coast Mollusks*), A. A. Hubrecht (*Nemertean*), A. Milne-Edwards (*Crustacea*), and A. E. Verrill (*Alcyonaria*).

[B.]

INVESTED FUNDS OF THE MUSEUM.

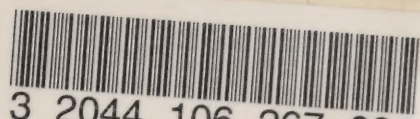
IN THE HANDS OF THE TREASURER OF HARVARD COLLEGE, SEPT. 1, 1887.

Sturgis-Hooper Fund	\$100,000.00
Gray Fund	50,000.00
Agassiz Memorial Fund	297,933.10
Teachers and Pupils Fund	7,594.01
Permanent Fund	117,469.34
Humboldt Fund	7,740.66
	<hr/>
	\$580,737.11

The payments on account of the Museum are made by the Bursar of Harvard College, on vouchers approved by the Curator. The accounts are annually examined by a committee of the Museum Faculty. The only funds the income of which is restricted, the Gray and the Humboldt Funds, are annually charged in an analysis of the accounts with vouchers to the payment of which the income is applicable.

The income of the Gray Fund can be applied to the purchase and maintenance of collections, but not for salaries.

The income of the Humboldt Fund can be applied for the benefit of one or more students of Natural History.



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